

Multi-Scale Recurrent Transformer model for Predicting KSTAR PF Super Conducting Coil Temperature

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Superconducting magnets play a critical role in a superconducting-based nuclear fusion device. As the temperature of superconducting magnets increases with a change in current, it is important to predict their temperature to prevent excessive temperature rise of coils and operate them efficiently. We present Multi-Scale Recurrent Transformer(MSR-Transformer) system, a deep learning model for forecasting the temperature of superconducting coils. Our system recurrently predicts future temperature data of the superconducting coil using previous data obtained from a multi-scale KSTAR PF coil dataset and latent data calculated from previous time step. We apply a multi-scale temperature subsampling approach in our model to learn both the details and the overall structure of the temperature data effectively. We demonstrate the effectiveness of our model through experiments and comparisons with existing models.

Speaker's Affiliation

Korea Institute of Fusion Energy(KFE), Daejeon

Member State or IGO/NGO

South Korea

Primary author: Dr GILL, Kwon (Korea institute of Fusion Energy)

Co-author: Dr LEE, Hyunjung (kfe)

Presenter: Dr GILL, Kwon (Korea institute of Fusion Energy)

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